


# Oncoplastic management of a lower-inner quadrant breast cancer using inframammary crescent mastoplasty with an anterior intercostal artery perforator flap: a case report

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## ABSTRACT

Oncoplastic breast surgery aims to optimize oncologic control and cosmetic outcomes. This report presents a case of a 57-year-old woman with hormone receptor-positive invasive ductal carcinoma in the lower-inner quadrant of the left breast. A partial mastectomy with immediate reconstruction using inframammary crescent mastoplasty based on the anterior intercostal artery perforator (AICAP) flap was performed. The patient experienced a smooth recovery, received adjuvant hormonal therapy, and showed no recurrence after one year. This case highlights the underreported use of the AICAP-based crescent flap in oncoplastic reconstruction for challenging tumor locations, suggesting that this versatile technique may broaden reconstructive options and improve cosmetic outcomes in appropriately selected patients.

**KEYWORDS:** breast; breast cancer; partial mastectomy; breast reconstruction; plastic surgery.

## INTRODUCTION

Breast cancer is the most common malignant disease in women. Consequently, surgical strategies have progressively shifted from purely ablative procedures to approaches that prioritize not only oncologic safety but also the preservation of the breast's aesthetic and functional integrity<sup>1</sup>. It remains essential to achieve complete tumor excision with clear margins<sup>2</sup> while simultaneously considering the aesthetic impact on the patient<sup>3</sup>.

The advent of oncoplastic surgery, which combines oncologic principles with plastic and reconstructive techniques, has revolutionized breast-conserving therapy<sup>4</sup>. These integrated approaches allow for wider resections without compromising cosmetic outcomes, thus improving both disease control and quality of life<sup>5</sup>.

Among volume displacement techniques, managing tumors in the lower-inner quadrant of the breast remains particularly challenging due to limited tissue availability, a higher risk of visible deformities, and the proximity to critical vascular structures<sup>6</sup>. Although the inframammary crescent mastoplasty has been described as a “half-moon” flap, its anatomical basis and vascular supply correspond to the anterior intercostal artery

perforator (AICAP) flap — a fasciocutaneous flap based on perforators arising from the intercostal vessels near the inframammary fold.

However, reports describing the use of AICAP-based crescent flaps for partial breast reconstruction are scarce in the literature, and their technical details remain underrepresented compared with other perforator-based approaches. In contrast, the lateral intercostal artery perforator (LICAP) and thoracodorsal artery perforator (TDAP) flaps are more commonly utilized due to their reliable vascular anatomy and larger skin paddle; yet, their application is often limited to defects in the lateral or upper quadrants, making them less suitable for medial or inferior defects<sup>7</sup>.

In the case presented, an inframammary adipofascial flap based on the AICAP pedicle was utilized to perform a partial mastectomy and immediate volume displacement reconstruction. This approach enabled successful oncologic resection with optimal aesthetic restoration, especially in a region of the breast where traditional oncoplastic options are limited.

This report aimed to highlight the clinical utility and reproducibility of the AICAP-based inframammary crescent flap in the

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Conflict of interests: nothing to declare. Funding: none.

Received on: 12/08/2025. Accepted on: 12/11/2025.

treatment of tumors located in the lower-inner breast quadrant, underscoring its role as a safe and effective oncoplastic alternative<sup>6</sup>.

## CASE REPORT

A 57-year-old *mestizo* female patient with no relevant personal or family medical history, good quality of life, and a balanced diet presented with an 8-month history of a progressively enlarging and painful mass in the left breast. Physical examination revealed a 3 cm, hard, poorly mobile, and tender mass located in the lower-inner quadrant of the left breast.

## Diagnostic evaluation

Imaging studies, laboratory tests, and histopathological analyses were performed, yielding the following results:

- Laboratory tests: Within normal limits.
- Ultrasound: A solid, hypoechoic nodule measuring 1.7 × 2 cm with spiculated margins and an echogenic halo was identified at the 6 o'clock position. The nodule was oriented parallel to the skin and exhibited predominantly peripheral vascularity and internal amorphous calcifications. Axillary lymph nodes were normal in size and morphology; no adenopathy was observed. Breast Imaging Reporting and Data System (*BIRADS*) category 5 was assigned.
- Mammography: A high-density mass with poorly defined margins associated with coarse, heterogeneous microcalcifications was seen in the central area of the lower quadrants. *BIRADS* 5.
- Core needle biopsy (left breast, 5–6 o'clock position): Infiltrating ductal carcinoma, provisional histological grade II, hormone receptor-positive.
- Immunohistochemistry:
  - Estrogen receptors: Positive
  - Progesterone receptors: Positive
  - HER2/neu: 2+ equivocal → SISH: Not amplified (Negative)
  - Ki-67: 15%
- Axillary fine-needle aspiration (FNA): Negative for malignancy.

## Rationale for the reconstructive approach

Given the tumor's location in the lower-inner quadrant, achieving an oncologically safe resection while maintaining acceptable breast contour posed a particular challenge. The patient had moderate-sized, ptotic breasts, providing sufficient tissue in the inframammary region for local volume displacement. Among the available oncoplastic options, a crescent-shaped inframammary flap based on AICAP was selected. This flap offers reliable vascularity, minimal donor-site morbidity, and excellent reach for defects in the inferior and medial quadrants. In this specific anatomical location, lateral perforator flaps such as LICAP or TDAP have limited access and arc of rotation. The patient's strong

preference for a single-stage procedure with minimal additional scarring further supported this reconstructive choice.

## Treatment and surgical intervention

Given the hormone receptor-positive tumor and negative axillary cytology, the patient underwent surgical treatment consisting of a partial mastectomy with inframammary crescent mastoplasty reconstruction and sentinel lymph node biopsy.

## Surgical technique

The patient was placed in the supine position on the operating table, with both breasts included in the sterile field for intraoperative comparison. A crescent-shaped flap was designed using two parallel lines: one 0.5 cm above the true inframammary fold and another 2 cm below it, which defined the flap width.

A skin incision was made along the upper line, followed by wide local excision of the tumor. The resected specimen (approximately 2.5 cm in diameter) was oriented and inked, ensuring macroscopic margins of 2–3 cm. Frozen section analysis confirmed negative margins.

The skin between both lines was de-epithelialized, preserving the central dermofat junction. A second incision was made along the lower line, creating a fasciocutaneous crescent flap. Intraoperative ultrasound was used to identify an intercostal perforator within the central crescent, which ensured vascularization and helped avoid fat necrosis.

The flap included full-thickness tissue from the skin to the muscle fascia. Once the volume and bleeding at the flap tip were confirmed, the superior edges of the crescent were rotated and sutured to the residual breast tissue using absorbable sutures to fill the defect. A closed suction drain was placed, and skin closure was completed using interrupted and continuous subcuticular sutures. A separate axillary incision was used for sentinel lymph node biopsy with a gamma probe.

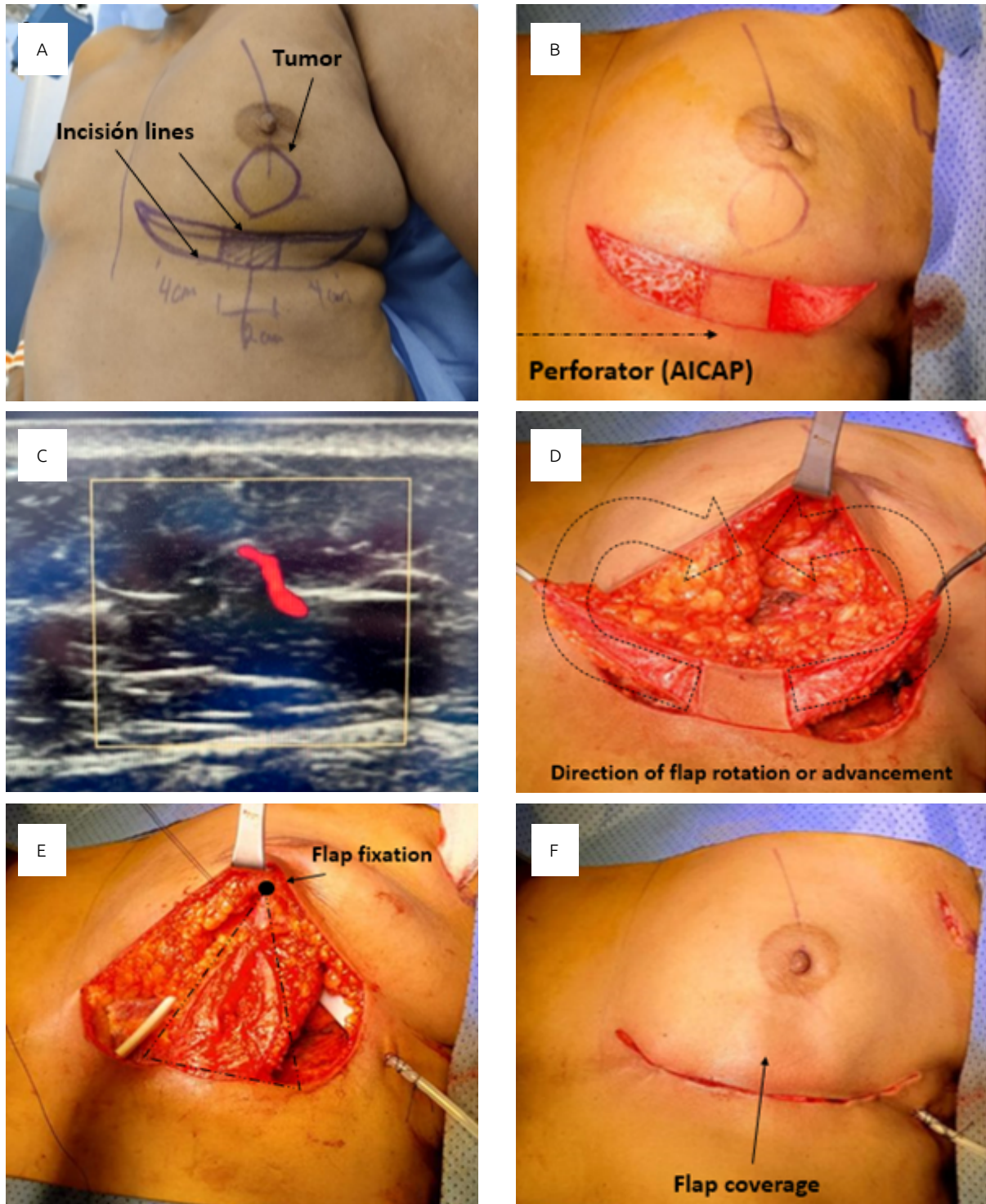
This technique is best indicated for small-to-moderate volume resections in patients with adequate inframammary tissue laxity and preserved skin elasticity. It is particularly suitable for tumors located in the lower-inner or central-inferior quadrants, where other local flaps (*e.g.*, LICAP or TDAP) may be less feasible due to limited reach or donor site visibility. Conversely, the technique may be limited in very small breasts or when prior inframammary scars compromise the perforator anatomy.

Technical tip: Meticulous identification of AICAP — either by handheld Doppler or intraoperative ultrasound — is essential to ensure adequate vascular supply and minimize the risk of partial fat necrosis. Care should also be taken to avoid excessive tension during flap rotation to preserve contour and perfusion.

Postoperatively, the patient received intravenous antibiotics and analgesics and was discharged on postoperative day 2 without complications.

A schematic of the surgical technique demonstrates the crescent-shaped flap outlined using two lines parallel to the inframammary fold: one 0.5 cm above and one 2 cm below. The area was de-epithelialized, preserving the central dermofat

junction. After *en bloc* tumor excision with safe margins, the flap was rotated and anchored to the defect to achieve adequate three-dimensional reconstruction and maintain breast symmetry (Figure 1).



**Figure 1.** Surgical findings. A) Crescent-shaped adipofascial flap design, 10 cm in length, marked with a violet line. B) Crescent-shaped area of skin de-epithelialized. C) Intraoperative ultrasound identification of an intercostal perforator. D) Flap harvested via inframammary incision and caudal window. E) De-epithelialized skin included in the inframammary flap. F) Tissue rotated cranially with final skin closure.

## Follow-up and outcomes

The patient received adjuvant radiotherapy per current breast cancer treatment guidelines, despite histological margins being greater than 0.8 mm. Final pathological staging was T2N0M0 according to the TNM Classification of Malignant Tumors. She also received adjuvant endocrine therapy with an aromatase inhibitor.

At one-year follow-up, no recurrence was observed. Breast volume and contour were symmetrical, including the inframammary fold, lower pole, and nipple-areola complex. The donor site deformity was inconspicuous from the anterior view, especially from the patient's perspective (Figure 2).

## DISCUSSION

Oncoplastic breast surgery integrates oncologic safety with aesthetic preservation, improving both physical and psychological outcomes for breast cancer patients<sup>1-13</sup>. In this case, the crescent-shaped flap technique was selected for a 3 cm hormone-dependent tumor located at the inframammary fold (H6-BC area) with clinically negative axilla. The absence of skin or muscle invasion favored this conservative approach<sup>1,8</sup>.

The inframammary crescent flap, based on AICAP, enabled complete tumor excision with clear margins while preserving breast contour. This preservation is crucial in the lower pole to avoid deformities such as nipple displacement or the "bird beak" effect<sup>2,3,9</sup>. Compared to radial or vertical dermoglandular flaps, crescent mastoplasty generally results in shorter operative times, more concealed scars, and improved symmetry, especially in small-to-medium-sized breasts<sup>4,12</sup>.

The AICAP flap, first described by Hamdi et al.<sup>12</sup>, offers a reliable vascular supply without muscle sacrifice, thereby minimizing donor-site morbidity. Its anatomical consistency, with perforators arising from anterior intercostal branches of the internal mammary artery between the 4<sup>th</sup> and 6<sup>th</sup> intercostal spaces,

allows for safe flap viability<sup>9,14</sup>. Intraoperative preservation of this vascular axis contributed to flap perfusion and favorable healing without complications<sup>9</sup>.

Immediate reconstruction with this flap eliminated the need for additional surgeries, enhancing patient recovery and psychological well-being<sup>10,11</sup>. Negative surgical margins and a clear sentinel lymph node biopsy confirmed oncologic safety, correlating with improved prognosis<sup>11,14</sup>.

When compared with other lateral- or dorsal-based perforator flaps such as LICAP and TDAP flaps, the AICAP crescent flap offers certain practical advantages. It generally requires shorter operative time, avoids patient repositioning, and results in lower donor-site morbidity, since no muscle or lateral thoracic tissue is harvested. However, its main limitation lies in its smaller arc of rotation and limited volume replacement, making it best suited for partial resections in the lower-inner or central-inferior quadrants<sup>7,15</sup>.

Although underreported, recent studies highlight the increasing use of AICAP flaps in partial breast reconstruction, demonstrating high patient satisfaction and low complication rates<sup>15-21</sup>. Kim et al.<sup>16</sup> and Xie et al.<sup>17</sup> confirmed its favorable aesthetic outcomes, while Singh et al.<sup>18</sup> showed applicability in East Asian populations. Other reports emphasize the flap's minimal donor morbidity compared to traditional techniques<sup>15</sup> and recommend preoperative Doppler ultrasound for precise perforator mapping<sup>19</sup>.

Limitations include a restricted arc of rotation and small skin paddle, which may limit use in larger defects<sup>20</sup>. Nonetheless, in resource-limited settings or in elderly patients where extensive reconstruction is contraindicated, the AICAP flap provides a reliable and reproducible alternative<sup>21</sup>.

Future perspectives should focus on expanding the evidence base through multicenter experiences and larger patient series to validate the long-term oncologic safety, aesthetic stability, and patient-reported outcomes of the AICAP-based crescent flap. Such studies will help standardize indications and refine surgical planning for lower-pole breast reconstruction.



**Figure 2.** Postoperative results. A) One-year aesthetic outcome.

## CONCLUSIONS

In conclusion, the crescent flap oncoplastic case illustrates the practical applications and benefits of this advanced technique in modern breast cancer management. By combining effective tumor excision with adequate margins and immediate breast reconstruction, oncoplastic surgery not only meets the oncologic needs of patients but also prioritizes the aesthetic and functional preservation of the breast.

This approach represents a reliable and reproducible oncoplastic alternative for challenging tumor locations, particularly in the lower-inner quadrant, balancing oncologic safety with optimal cosmetic results.

## AUTHORS' CONTRIBUTION

MEZV: Conceptualization, Data curation, Formal analysis, Funding acquisition, Investigation, Methodology, Project administration, Resources, Software, Supervision, Validation, Visualization, Writing – original draft, Writing – review & editing.

LVPG: Conceptualization, Data curation, Formal analysis, Funding acquisition, Investigation, Methodology, Project

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